

Docket No.: 42P11759

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Huffman

Application No.: 09/939,347

Filed: August 24, 2001

For: A Method for Determining the End of  
 Transmission in a Software Radio  
Having Multiple Processors

Examiner: Ly, Anh Vu H.

Art Group: 2616

Commissioner of Patents  
 P.O. Box 1450  
 Alexandria, VA 22313-1450

**DECLARATION UNDER 37 CFR 1.131 IN SUPPORT OF PRIOR INVENTION**

Sir :

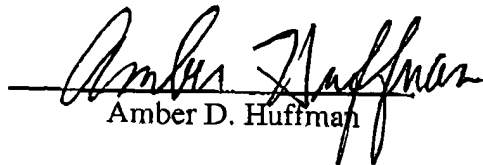
I, Amber D. Huffman declare:

1. I am an inventor of the claims of the above-captioned patent application ("the Application") and an inventor of the subject matter described therein.
2. Prior to July 31, 2001, the filing date of U.S. Patent Application Publication No. 2003/0026198 cited in a Final Office Action mailed March 29, 2006, the invention claimed in the Application had been conceived and reduced to practice in the United States.

3. Attached Exhibit A is a copy of an invention disclosure form describing the design of the Method for Determining the End of Transmission in a Software Radio Having Multiple Processors, and establishes that the subject matter claimed in the Application had been reduced to practice in the United States prior to July 31, 2001.
4. Attached Exhibit B is a copy of a letter that accompanied a first draft of the patent application for the Method for Determining the End of Transmission in a Software Radio Having Multiple Processors, and establishes diligence in reducing the invention to practice in the United States prior to July 31, 2001.

I further declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application of any patent issuing thereon.

Dated: May 1, 2006

  
Amber D. Huffman

## INTEL INVENTION DISCLOSURE

LEGAL ID#

DATE: 1/8/2001

FEB 8 2001

It is important to provide accurate and detailed information on this form. The information will be used to evaluate your invention for possible filing as a patent application. When completed, please return this form to the Legal Department at JF3-147. If you have any questions, please call 264-0444 or 264-0998.

1. Inventor: Huffman Amber D  
 Last Name First Name Middle Initial  
 SS# 482-94-3197 WWID 10504359 Phone (503) 264-7929 M/S: JF2-53  
 Home Address: 39725 NW Maller Lane City Banks State OR Zip 97106  
 Citizenship: USA BUM Presenter: Sanjay Panditji  
 Group: (e.g. TMG, ICG, CEG) IAL Division Name ISL Subdivision ID&I  
 Supervisor\* Vittal Kini WWID 10034590 Phone 264-8383 M/S: JF2-53

2. Title of Invention: Method for determining transmit end across multiple processors.  
 3. What technology/product/process (code name) does it relate to: Wireless networking (HomeRF/Bluetooth/802.11(a/b)) / software radio

4. Stage of development (i.e. % complete) 50%

5. (a) Has a description of your invention been, or will it shortly be, published outside Intel:

NO: X YES: \_\_\_\_\_ DATE WAS OR WILL BE PUBLISHED: \_\_\_\_\_  
 If YES, was the manuscript submitted for pre-publication approval? YES: \_\_\_\_\_ NO: \_\_\_\_\_

(b) Has your invention been used/sold or planned to be used/sold by Intel or others?

NO: X YES: \_\_\_\_\_ DATE WAS OR WILL BE SOLD: \_\_\_\_\_

(c) Does this invention relate to technology that is or will be covered by a SIG (special interest group)/standard/ or specification?

NO: X YES: \_\_\_\_\_ Name of SIG/Standard/Specification: \_\_\_\_\_

(d) If the invention is a semiconductor device, actual or anticipated date of tapeout? \_\_\_\_\_

(e) If the invention is software, actual or anticipated date of any beta tests. Q1'2001

6. Was the invention conceived or constructed in collaboration with anyone other than an Intel blue badge employee or in performance of a project involving entities other than Intel, e.g. government, other companies, universities or consortia?

NO: X YES: \_\_\_\_\_ Name of individual or entity: \_\_\_\_\_

PLEASE READ AND FOLLOW THE DIRECTIONS ON THE ATTACHED  
 PAGE ON HOW TO WRITE A DESCRIPTION OF YOUR INVENTION

# EXHIBIT A

Please attach a page to this form, DATED AND SIGNED BY AT LEAST ONE PERSON WHO IS NOT A NAMED INVENTOR, to provide a description of the invention, and include the following information:

1. Describe in detail how the invention works.
2. Describe advantage(s) of your invention over what is done now.
3. Include at least one figure illustrating the invention. If the invention relates to software, include a flowchart or pseudo-code representation of the algorithm.
4. Value of your invention to Intel (how will it be used?).
5. Identify the closest or most pertinent prior art that you are aware of.
6. Who is likely to want to use this invention or infringe the patent if one is obtained and how would infringement be detected?

\*HAVE YOUR SUPERVISOR READ, DATE AND SIGN COMPLETED FORM

DATE: 1/25/2001

INVENTOR  
SUPERVISOR: Amber Huffman

DATE: 2/5/2001

SUPERVISOR: M. Vital Kiri

BY THIS SIGNING, I (SUPERVISOR) ACKNOWLEDGE THAT I HAVE READ AND UNDERSTAND THIS DISCLOSURE, AND RECOMMEND THAT THE HONORARIUM BE PAID

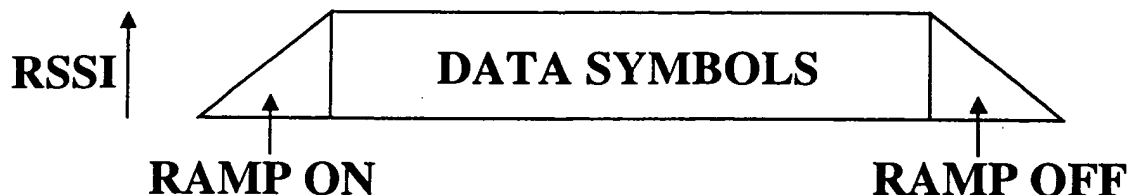
## Abstract

### 1. Describe in detail how the invention works.

In wireless networking protocols it is very important to know when the last symbol of the packet was transmitted on air because all subsequent transmits are based on that time. One issue in a software radio implementation is that the media access layer (MAC) that controls the timing is often on a separate processor from the final processor or FPGA that is responsible for sending the data on air. The MAC must be informed when the last symbol is actually transmitted on air because the MAC is responsible for all transmit timing. It may be tens of microseconds between when the MAC "transmits" the symbol to the next processor and when the symbol is actually transmitted out the radio antenna.

This invention covers a method for determining when a packet transmit ends across multiple processors. A receive signal strength indicator (RSSI) can be calculated on the data being transmitted. When RSSI falls below a certain threshold the MAC knows that the last symbol of the transmit has been sent on-air. This is a deterministic method because the transmitter controls the signal strength of the samples being sent. The RSSI calculation is already performed on the received samples so the hardware/software for this calculation is already present.

One possible alternative to this method would be to have the final processor/FPGA interrupt when the last symbol it receives is transmitted. However, when transmitting a packet there is a "ramp-off" period where the transmitter continues to transmit while slowly ramping down its power. So it will not work to simply flag when the last symbol is transmitted because the transmitter continues to transmit symbols after the last symbol of the packet. The last symbol sent is well past when the last data symbol was sent.



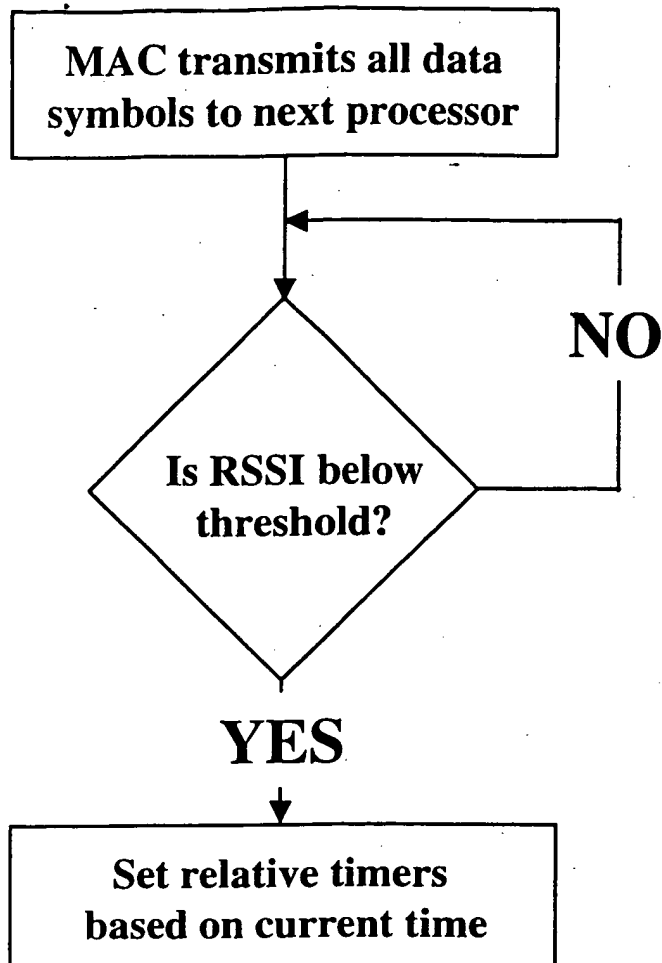
As shown above, there is a ramp on period and a ramp off period where the transmitter is still sending symbols to allow the power amplifier of the transmitter to ramp on or ramp off. The RSSI value slowly creeps up from zero during ramp on to its final threshold that will be sent during the data portion of the transmit. After the last data symbol is sent on air the RSSI value will decline during the ramp off. The MAC can look for the RSSI value to fall below a certain threshold and then it knows that the last data symbol has been sent.

### 2. Describe advantage(s) of your invention over what is done now.

I do not know of software radio implementations of HomeRF/Bluetooth/802.11(a/b). When these protocols are implemented in this issue does not arise. I would imagine that one other way it's done in software is to place some sort of flag on the last data symbol and then have the last processor/FPGA look for that flag and interrupt when it sees the flag. The problem with this mechanism is that the final processor look for this flag on each and every symbol, wasting precious processing resources. In my invention the MAC is the only processor wasting resources looking at the RSSI value and it only looks at the RSSI value after it is done with its portion of the transmit. The MAC has nothing else to do but wait for the RSSI value.

### 3. Include at least one figure illustrating the invention. If the invention relates to software, include flowchart or pseudo-code representation of the algorithm.

The flowchart below demonstrates the algorithm. The MAC transmits all of the data symbols and then checks the RSSI value until it is below the threshold which means that all data symbols have been transmitted.



4. Value of your invention to Intel (how will it be used?).

This invention could be used when there are multiple DSP coprocessors to the main Intel processor used to perform data communication, like HomeRF, Bluetooth or 802.11(a/b).

5. Identify the closest or most pertinent prior art that you are aware of.

I am not aware of any.

6. Who is likely to want to use this invention or infringe the patent if one is obtained and how would infringement be detected?

The most likely infringers are those parties that are doing software radio work.

Witnessed by: *[Signature]* on 1-25-01

# BLAKELY SOKOLOFF TAYLOR & ZAFMAN

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ORANGE COUNTY/COSTA MESA, CA  
SAN DIEGO/LA JOLLA, CA  
PORTLAND/LAKE OSWEGO, OR  
SEATTLE/KIRKLAND, WA

July 23, 2001

Amber Huffman  
Intel Corporation  
5200 Elam Young Parkway  
M/S:JF2-53  
Hillsboro, OR 97124

**Attorney/Client Privileged**  
*via Federal Express*

Re: **Intel Corporation**  
U.S. Patent Application for: A METHOD FOR DETERMINING THE  
END OF TRANSMISSION IN A SOFTWARE RADIO HAVING  
MULTIPLE PROCESSORS  
Our File No.: 042390.P11759

Dear Amber:

Enclosed for your review is a draft of the above-referenced patent application, including the drawings. Please do not hesitate in making any changes. Feel free to either mark your changes, corrections, or additions on the draft or call Mark to discuss them.

Please read over the entire application carefully to ensure that it provides a technically accurate and complete description of the invention. Specifically, please verify that the application sets forth sufficient detail to enable someone skilled in the art (e.g., the average practitioner in the technological field of the invention) to make and use your invention. In addition, the application must set forth what is, in your opinion, the best way of making and using your invention. For instance, if there are special materials or configurations that you prefer, they must be set forth in the application. The application should also mention alternative ways of implementing your invention, even if such alternatives are not the preferred way of doing things.

Recall that you have a duty to disclose to the Patent and Trademark Office information you are aware of that is material to patentability. For example, if you are aware of any similar products or articles bearing on your invention, please bring them to our attention.

EXHIBIT B

# BLAKELY SOKOLOFF TAYLOR & ZAFMAN

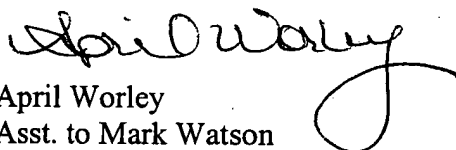
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It is our understanding that the invention has not been patented or described in a printed publication in this or a foreign country. It is also our understanding that the invention has not been in public use or offered for sale in this country, more than one year prior to the date that we intend to file this application. Please let us know as soon as possible if you believe otherwise.

Please give Mark a call once you have completed your review. Thank you for your assistance.

Sincerely,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP



April Worley  
Asst. to Mark Watson

/amw  
enclosure